ENVIRONMENT PROTECTION BOARD

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BUILDING A GAS PIPELINE THROUGH THE ARCTIC

What About the Caribou?

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the Caribou

The barren-ground caribou and its close relative the eurasian reindeer occur in the far northern lands around the world. In the central arctic of Canada there are four herds which at present number about 400,000 animals. In Alaska there are a further six herds, estimated at slightly over half a million caribou. The so-called "Porcupine" herd, whose range would be traversed by the proposed gas pipeline, roams the Northern Yukon and Northeast Alaska. In the mid 1960's this herd was estimated to have about 150,000 animals.

The barren-ground caribou spend only part of their lives on the treeless tundra or barrens for which they are named. They are nomads and wander continually to find the right food and habitat conditions.

They spend the winter in the sparse, stunted spruce forests of the sub-arctic, where they dig for lichens or sedges buried beneath the snow. They endure extremely low temperatures. In the Ogilvie Mountains, where caribou from the Porcupine herd often winter, it is a rare winter when temperatures do not drop below -70°F, and the temperature may remain between -40° and -60°F for weeks. But even this extreme cold does not greatly affect the caribou, for they are equipped with a thick coat of hollow hair. Even their noses are furred for protection when they thrust their muzzles into the snow to smell for lichens.

Deep snow or icy crusts can, however, bring hardship and even starvation to the caribou by restricting their movements and making digging difficult. When this happens the animals may turn for food to lichens growing on tree branches above the snow.

In early spring, as the days lengthen and the snows begin to melt and compact, the caribou begin to gather and move slowly north. The cows of the herd generally precede the bulls in this spring migration. Their goal is an area of tundra some 300 to 400 miles north, where the calves are traditionally born.

The caribou have a very strong drive to reach the calving grounds, but are clearly unconscious of the reason for getting there. In some years, when abnormally deep snow delays the migration, the calves are born on the way. Yet the mother rushes on, abandoning her calf or killing it by leading it across flooded rivers or slush-covered lakes.

During migration the animals follow routes offering ease of travel, such as mountain ridges or glacial eskers where the snow is blown away or melted earlier. Many of these routes have been used for many years, as trails worn in the soil or scree attest.

We know little of how these routes are learned, or how the caribou navigate. They have been known to cross frozen lakes for up to 50 miles under foggy or cloudy conditions. We do not even know what triggers their initial urge to migrate.

In the course of their migration the caribou encounter formidable natural obstacles, including snow conditions of many kinds, flooded and ice-choked rivers, steep river banks, steep loose scree slopes, and sharp ridges. Anyone who has observed or hunted caribou in the mountains, where the caribou of the Porcupine herd spend a great deal of their time, can attest to their ability to negotiate almost any surface or grade. Many people believe that their abilities in the mountains are equal to those of mountain sheep.

In early June, while snow still lies on the ground, the calves are born on a particular area of tundra along the coastal plain. This area of calving is consistent for a herd, although the winter ranges, and consequently the migration routes, may suddenly change after many years. The history of the north is replete with stories of hardship or starvation when a caribou migration has failed to materialize where it was expected.

Just why the caribou calve in their traditional areas is not clear. The calving grounds in Canada's central arctic, in the words of a Canadian Wildlife Service biologist, seem to be "the least hospitable tundra locations within the general regions in which they (the caribou) are found." Biologists have repeatedly found calves dying from adverse weather conditions. (Yet the calving grounds of the Arctic Herd in Alaska are relatively snow free, well vegetated, and generally free from adverse weather.) In the case of the Porcupine herd the calving grounds are not known precisely, so that the characteristics of terrain, snow, vegetation, and weather that the animals encounter at calving time are not yet known.

The calves of caribou are among the most precocious of all ungulates. They stand and suckle almost immediately and walk within hours of birth. After a few days a calf can outrun even the tundra wolf. They also begin to graze sooner after birth than most other hoofed animals.

The period immediately following birth is critical. The female pays close attention to her calf, licking, smelling and nursing it, and inducing it to follow her. During this period the cow and calf learn to recognize each other by smell, and probably by voice, so that they can find each other in the great herds that form soon after calving, and the cow can protect and nurse only her own calf.

As soon as the new born calf can travel well, the cow and calf join others and the herds grow until most of the animals are in huge herds which may number tens of thousands. Often, the bulls have caught up with the cows and calves, and are present in these great post-calving aggregations.

The function of these herds is still being debated. Some say that the cows and calves herd for protection from wolves, while others maintain that they seek protection from the hoards of biting insects which harass them during this period. During this "fly season" the herds remain in the mountains, where winds and late snow patches offer them some protection. They are constantly in motion, grazing and browsing here and there as they go. Indeed, a herd of thousands of animals can pass through an area almost without leaving a sign of its passing, except for an occasional browsed willow leaf or a trail in particularly wet ground. Only by moving constantly could these herds avoid overgrazing or trampling the tundra vegetation, and damaging the permafrost beneath it.

In August the herds disintegrate. Small bands of caribou are scattered everywhere over the tundra. Both males and females rapidly begin to put on weight now that the fly harassment has ended and, for the females, the demands of nursing are less. By mid August the caribou begin to drift south, again forming larger herds as they go. With the first heavy snow they make a rapid migration south. The rut occurs some time in October during the fall migration. By mid November the caribou are back on the winter ranges, where once again they face the season of hardships.

Possible Effects of Pipeline on Caribou

The gas pipeline proposed by Gas Arctic / Northwest Project Study Group currently is a 48-inch diameter pipe which, depending on the terrain and prevailing conditions, generally will be buried in a trench or partly buried and covered with an earth mound or berm.

The map shows that the pipeline route along the Porcupine River cuts across both the spring and fall migration routes. If this route were chosen, it would be vital to avoid physically obstructing the migrating caribou. An exposed 48-inch pipe might effectively act as a barrier since caribou do not customarily jump obstacles, as do white-tailed deer. The Alaskan pipeline companies have experimented with artificial crossings (both underpasses and overpasses) and have found the caribou very reluctant to use them.

Undoubtedly, if artificial crossings are to be accepted by the caribou, they would have to be at or near traditional migration routes. Since these routes may change from year to year, and because not enough is yet known about the migrating habits of the Porcupine caribou, it would be difficult to locate these crossover paths accurately.

On the other hand, a bermed or buried pipeline is unlikely to act as a barrier to caribou movement. Indeed, the opposite might occur — the caribou could be attracted by the ease of travel offered by the pipeline right-of-way (just as they utilized seismic lines and winter haul roads during the spring migration in 1971), which could deflect their movements and alter the patterns of range use. Large numbers of caribou travelling on a berm might also contribute to erosion on the berm, with the consequent exposure of the pipe, and could also interfere with revegetation. No experiments to explore ways of discouraging caribou from using seismic lines or roads have yet been carried out.

If the Porcupine River route is chosen, construction activity would need to be timed to avoid the spring and autumn periods of most active movements. This would be necessary to prevent the disturbance associated with construction from deterring the animals' migration.

The coastal alternate route is through or near the calving grounds of the Porcupine caribou. Pipeline construction here could disturb the females, which react more readily to disturbances at this time of year than at other times. Disturbance might also interfere with the process by which the cow and calf learn to recognize each other. A calf abandoned by its mother would be more vulnerable to predation by wolves or to hostile behaviour by other caribou, would be inadequately nourished and therefore more vulnerable to severe weather, and would have difficulty in learning the behaviour patterns necessary for the formation of the large herds.

Thus there would again be a need to time construction to avoid the calving period, and to avoid any construction procedures that would alter the environment critical to caribou at calving time.

Disturbance caused by aircraft overflights is a factor for concern with caribou just as it is with several other wildlife species. Although caribou could be disturbed by aircraft at any time of the year, disturbance would be particularly serious at calving time or in winter when the animals might be stressed by food shortages. Hence, airlifts associated with construction should avoid passing at low levels over concentrations of the animals.

Caribou are very vulnerable to hunting. A healthy caribou can outrun its natural enemy the wolf on the open tundra, but has not necessarily evolved the tendency to flee from an approaching object that it has not obviously identified as a wolf. Therefore a stationary man or one shooting at some distance with a high powered rifle can have great success in hunting caribou. The hunting pressure on the herd will be accelerated if roads or airfields associated with the operation of the pipeline are open to the public. Already, the beginning of the construction of the Dempster Highway has increased hunting in the Ogilvie Mountains. This means that more refined management schemes must be imposed by the responsible government to control caribou sport hunting.

Increased access to the north country poses another potential threat, both to the caribou and to other wildlife. This is the increased hazard of fire. The spruce-lichen forests on the caribou winter range are extremely susceptible to fire, and the lichens require decades to regrow. Any aspect of pipeline construction or operation which increases the fire hazard must therefore be considered potentially detrimental to caribou.

Although there is no doubt that fire could reduce the potential carrying capacity of caribou winter ranges, the life-style of the caribou is such that they still would be able to exist or alter their movement patterns to accommodate these changes. For example, it has recently been pointed out that:

- Caribou often winter successfully in areas where lichens are scarce, either naturally or through fire damage, by eating sedges or other forage types which may be highly palatable foods. They may do this even though other areas containing abundant lichens are available.
- The populations of caribou that have existed in Alaska are thought to have been maintained at levels well below the potential dictated by food.

There is, however, little doubt that burned areas can cause caribou to abandon certain winter ranges or to alter migration patterns. A large fire that causes the caribou to greatly alter their migration routes could deprive northern villages, such as Aklavik, Fort McPherson and Old Crow, of a potential source of meat. Fire also can have other deleterious effects, such as allowing greatly increased erosion that in turn has destructive effects on wildlife associated with streams.

The Environment Protection Board recognizes that construction and operation of a gas pipeline will have both immediate and long-term effects on caribou. The results of studies presently being carried out should enable the Board to recommend means for reducing these effects to an acceptable level. If, however, the pipeline provides a means for public access to the Porcupine caribou range, the long-term effects could far exceed these now being considered by the Board.

Range and Migrations of the Porcupine Caribou

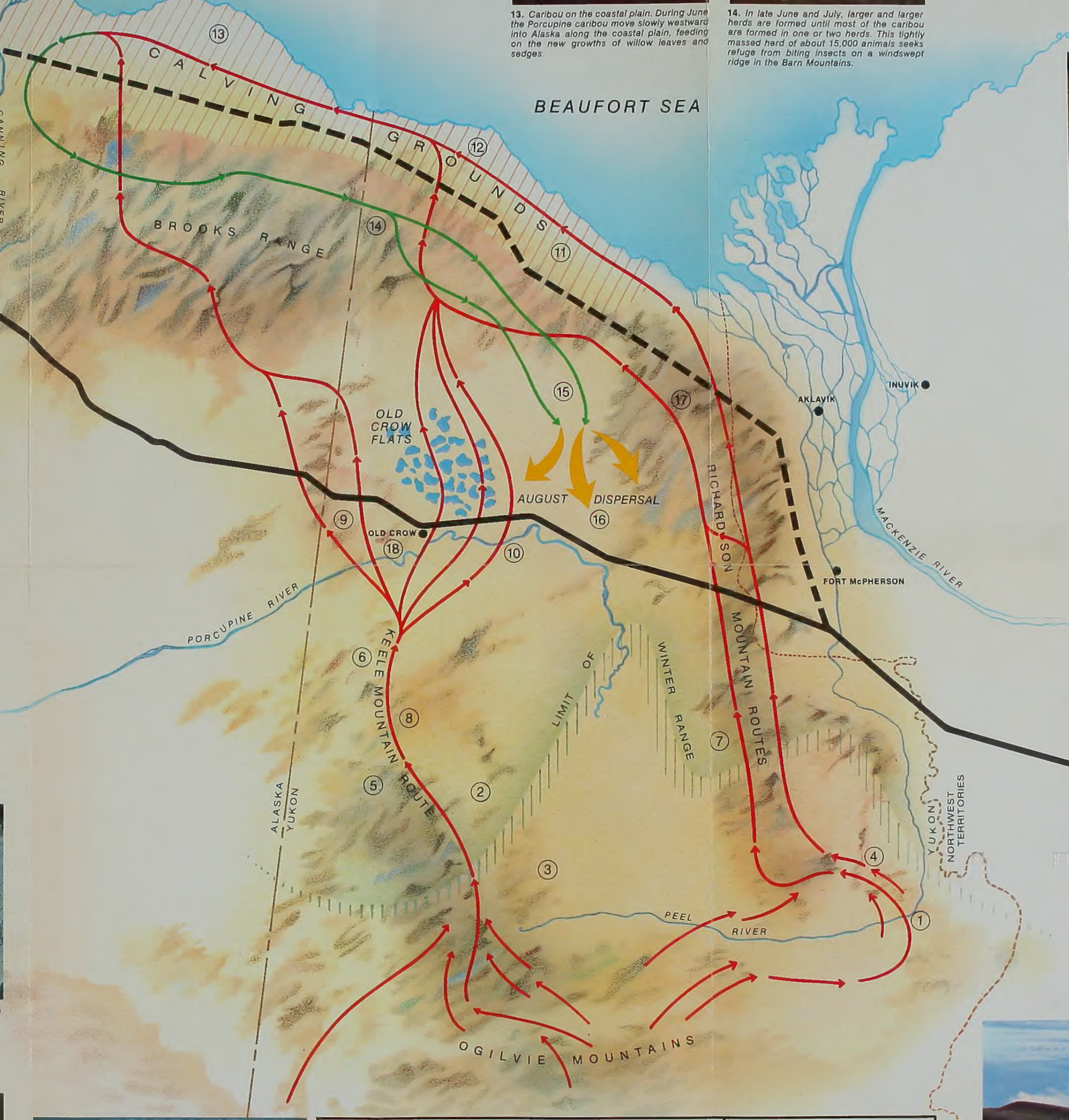
The range of the Porcupine caribou herd covers roughly 100,000 square miles of the Yukon and part of Alaska. In the spring the caribou begin a northward migration from their winter range (bottom of map). They follow two main routes, along either the Keele or Richardson Mountains, until they reach the traditional calving grounds on the north slope. They travel slowly west along the Coastal Plain to the Canning River in June, and in July they are massed in great herds that climb into the Brooks Range, moving east and then south. In August the herds disperse over a wide area (center of map), until the snow begins to fly again. Then they reform into herds and retrace their way back to the winter range.

These major ranges and migration routes, which are essential components of the caribou's life cycle, would be transected by either of the proposed pipeline routes. Interference with traditional migration routes, disturbance of the animals on the calving grounds or other critical ranges, creation of increased fire hazards, and opening of the country to hunters, would all adversely affect the caribou, and are some of the factors which concern pipeline planners and biologists.

All the above photos were taken by George Calef or Grant Lortie while conducting field studies for the Environment Protection Board in 1971.

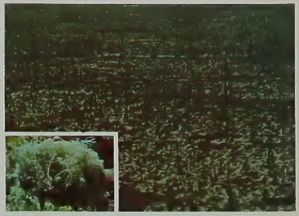
LEGEND

SPRING MIGRATION	→
SUMMER WANDERING	→
AUGUST DISPERSAL	➡
LIMIT OF WINTER RANGE	ılıılı
CALVING GROUNDS	////
PROPOSED GAS PIPELINE ROUTE	▬
POSSIBLE COASTAL ALTERNATE ROUTE	▬ ▬ ▬



1. *Caribou on winter range in early spring. These animals are still in winter coats as evidenced by the well developed manes. The majority of the caribou from the Porcupine herd which wintered in Canada in 1971 wintered south of the Peel River. In other years they have wintered on the Porcupine Plateau, east side of the Richardson Mountains and even as far north as Old Crow Flats.*

2. *Open-spruce forest winter range on the headwaters of the Porcupine River showing large extent of digging by caribou.*

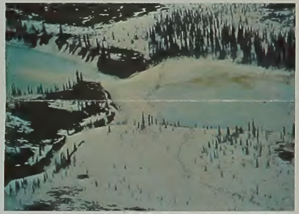


3. *Open-spruce forest showing the extensive beds of lichens which provide winter food for caribou. The insert shows the thickness (4-5 inches) of a mature mat of lichen. The caribou dig through snow up to two feet deep to reach lichen mats in winter (see previous photo). The lichen shown here includes **cladonia rangiferina** commonly called reindeer moss. A clump of lichens this thick may take 75-125 years to regrow following a forest fire.*

4. *An exposed ridge in early spring. All major migration routes in 1971 followed high ridges where wind and sun had packed or melted the snow. Seismic lines and winter haul roads were also utilized in areas of lower elevation. These routes were probably favoured in 1971 because of the unusually high accumulated snow fall which would make travel in other areas difficult. This unusual accumulation of snow fall also probably accounts for the lateness of the migration in 1971.*

5. *Migrating caribou on a mountain ridge south of Old Crow. The single file order is typical during migration. The insert shows the track left by several thousand caribou following in single file. Two major migration routes were followed in the spring of 1971—a route through the Richardson Mountains (both east and west sides) which continued up the Bell River and across the Barn Mountains, and a second route on the ridges of the Keele Mountains, which crossed the Porcupine River near Old Crow.*

6. *At the peak of spring migration there is light 24 hours a day. The caribou often move in the twilight.*

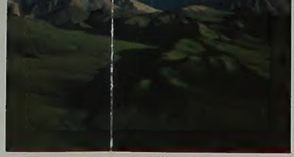


7. *A herd of about 400 caribou crossing the tributary of Eagle River as it flows out of the Richardson Mountains. About 20,000 caribou of the Porcupine herd utilize the Richardson Mountains during migration, often going up and down precipitous slopes and dangerously sharp ridges. Although groups vary in size, a typical group during spring migration would comprise about 400 animals.*

8. *A river flowing with ice during break up. A major segment of the Porcupine herd crossed the Porcupine River on May 22-26, which is two months later than the crossing of the river in 1953, the only previous year in which the spring migration of this herd was observed.*

9. *Grant Lortie of I.D.S. observing caribou during spring migration. The caribou are quite insensitive to disturbance at this time of year and much valuable information on calf crops, age structure and sex ratios in the population can be obtained. The percentage of over-wintered calves in the herd was estimated to be 15.7% in the spring of 1971.*

10. *Caribou swimming Porcupine River near Old Crow. Caribou are the strongest swimmers of the deer family and even younger calves can swim well. Note how high they ride in the water.*



11. *The coastal plain and foothills in the Northern Yukon. Somewhere in this area are the traditional calving grounds of the Porcupine caribou. The exact calving grounds of the Porcupine herd were not observed. On June 17-18, an estimated 20,000 caribou, including calves of the year, were observed on the coastal plain between the Spring and Kongakut Rivers. This indicated that some calving took place in the northern Yukon in 1971. These animals proceeded west into Alaska. In most years many caribou calve in the Arctic Wildlife Refuge in Alaska.*

12. *During the first few days after birth, the cow and calf form a strong bond of mutual recognition. Throughout the summer the calf will follow the cow and if separated they will locate each other even in the huge summer herds.*

13. *Caribou on the coastal plain. During June the Porcupine caribou move slowly westward into Alaska along the coastal plain, feeding on the new growths of willow leaves and sedges.*

14. *In late June and July, larger and larger herds are formed until most of the caribou are formed in one or two herds. This tightly massed herd of about 15,000 animals seeks refuge from biting insects on a windswept ridge in the Barn Mountains.*

15. *A small segment of a large post-calving aggregation in the northern Yukon. 40,000 caribou, including calves of the year, were counted from air photographs taken of post-calving aggregations in the northern Yukon. However, the number of caribou photographed was estimated to be only two-thirds the number present two days before the photos were taken. Thus, 60,000 caribou were estimated in the northern Yukon in 1971.*

16. *Two adult bulls running on the tundra. When the insect harassment ends the large herds disperse and small groups of caribou scatter everywhere over the tundra. It is at this time that the fat stores are accumulated for the rut and for winter. During August, the caribou were highly dispersed, most of them moving into Alaska.*

17. *A small band of mature bulls during autumn migration. In September 1971, caribou migrated through the Richardson Mountains and, in the west, made a rapid migration from the headwaters of the Coleen River to the headwaters of the Bluefish River in one week.*

18. *Indians skinning a caribou killed while crossing the Porcupine River during autumn migration. Caribou are killed by natives at Old Crow both during spring and autumn migration, but larger numbers are taken in autumn since the animals are fatter. The caribou in the western Yukon continued south through the Ogilvie Mountains, almost as far south as Dawson. Approximately 500 were killed by sport hunting on the Dempster Highway in October and November, 1971.*

A reminder of the herds, the hunt and our heritage. Without forethought, planning, education, controls and enforcement there will be only the reminder.

Caribou have been part of human culture for thousands of years. The beautiful paintings of reindeer, the first examples of human art and religion, which lay hidden for millennia in the caves of France and Spain, reveal the central importance of these animals to some of our ancestors in Europe. The comings and goings of the herds meant life and death to them in the great winter of the Pleistocene ice age. In the Canadian Arctic, the natives also have depended until very recently on caribou for all the necessities of life. These animals are part of our history and culture. They deserve our concern and understanding. We must no more allow a construction project to decimate these animals than we would allow one to destroy the buildings of Parliament, or the paintings of a famous artist.

Cave Painting in France: Font-De-Gaume, over 10,000 years old.

Environment Protection Board

Gas Arctic / Northwest Project Study Group has sponsored the Environment Protection Board to examine the potential effects on the environment of a natural gas pipeline they plan to build from Prudhoe Bay in Alaska to Alberta. The Board, which was set up in September, 1970, is composed of specialists in Arctic research or environmental science who have been drawn from Canadian sources.

The Board is organized as an autonomous body and is guided by the following objectives:

- ★ To become sufficiently familiar with the Arctic ecological systems along the area of operation to permit (a) estimates to be made of the biological costs or benefits of construction, and (b) judgments as to whether or not there would be effects that would result in widespread damage or major disruption of the ecological systems.
- ★ To become sufficiently familiar with the biological and physical environments so that pre-construction findings can be used as a basis for post-construction evaluation.
- ★ To make recommendations and conduct briefings, so that the results of the Board's deliberations can be used to maximum benefit in protecting the environment.
- ★ To make available the scientific results of its studies as a direct contribution towards northern scientific development.

The Boards deliberations are to continue throughout the proposed development and construction period and for a suitable time during the operational phase of the project.

Members of the Environment Protection Board are: Carson H. Templeton (Chairman), Dr. Ian McTaggart-Cowan, Dr. N. J. Wilimovsky, Dr. L. C. Bliss and Dr. M. E. Britton. Outside specialists are used for specific assignments. The administrative support of the Board is supplied by Inter-disciplinary Systems Ltd., 528 St. James Street, Winnipeg. Mr. D. W. Craik, president of that firm, acts as secretary of the Board.

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